

Remarks/Arguments

In the Office Action, the Examiner indicated that the Applicants are required to make corrections to claim 16 in order to properly withdraw the claim. Accordingly, claim 16 has been amended and withdrawn from consideration.

Rejections under 35 U.S.C. § 102

In the Office Action, the Examiner rejected claims 1, 2, 3, 5 and 8 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,476,498 to Amit P. Marathe ("*Marathe*"). Applicants respectfully request reconsideration of this rejection for at least the following reasons.

As to claim 1, claim 1 recites, among other things, "a barrier layer deposited over the dielectric layer and within the damascene interconnect structure, the barrier layer within the damascene interconnect structure being tapered." Underline added.

The Examiner alleges *Marathe* teaches a "barrier layer within the damascene interconnect structure being tapered" at column 5, lines 20-68, Fig. 3. Applicants respectfully disagree with this interpretation of the passage cited by the Examiner. Contrary to the Examiner's assertion, the passage cited by the Examiner only discloses a "barrier **232** [that] is optimized by increasing the thickness of the bottom **231** over the first channel **202** and the thickness of the sides **233** on the sidewalls of the via dielectric **212** over the thickness outside of the via **206**." See col. 5, lines 57-60, underline added. The bottom **231** that is referred to in this passage is the via bottom. **Nowhere in the cited passage is there any teaching of a tapered barrier layer.** Instead, *Marathe* at best teaches a thicker barrier layer in the vias relative to the barrier layers of the trenches to eliminate voids and increase resistance to electromigration and increase the mean time to failure. See col. 3, lines 50-55. In contrast, the tapered barrier layer as recited in claim 1 is to improve gap fill (e.g., reduce metal overhang or incomplete via sidewall material deposition). For at least these reasons, Applicants respectfully submit that claim 1 is patentable over *Marathe*.

Claims 2, 3, 5 and 8 depend from and add additional features to independent claim 1. Therefore, by virtue of their dependency, these claims are also patentable over *Marathe*.

35 U.S.C. § 103 Rejection

The Examiner rejected claim 4 under 35 U.S.C. § 103(a) as being unpatentable over *Marathe* in view of U.S. Patent No. 6,566,250 to Tu et al ("*Tu*") or U.S. Patent No. 5,592,024 to Aoyama et al. ("*Aoyama*"). Applicants respectfully request reconsideration of this rejection for at least the following reason.

Claim 4 depends from and adds additional features to independent claim 1. The deficiencies of *Marathe* as described above are not overcome by the teachings of *Tu* and/or *Aoyama*. Therefore, for at least this reason, claim 4 is patentable over *Marathe* in view of *Tu* or *Aoyama*.

The Examiner rejected claims 5-8 under 35 U.S.C. § 103(a) as being unpatentable over *Marathe* in view of U.S. Patent Application Pub. No. 2002/0024150 to Paul A. Farrar ("*Farrar*"). Applicants respectfully request reconsideration of this rejection for at least the following reason.

Claims 5-8 depend from and add additional features to independent claim 1. The deficiencies of *Marathe* as described above are not overcome by the teachings of *Farrar*. Therefore, for at least this reason, claims 5-8 are patentable over *Marathe* in view of *Farrar*.

The Examiner rejected claims 21-24 under U.S.C. § 103(a) as being unpatentable over *Marathe* in view of *Farrar* and U.S. Patent Application Pub. No. 2002/0184490 to McCown et al. ("*McCown*"). Applicants respectfully request reconsideration of this rejection for at least the following reason.

As for independent claim 21, claim 21 has similar features of independent claim 1 (i.e., "tapered barrier layer"). The deficiencies of *Marathe* as described above are not

overcome by the teachings of *Farrar* and/or *McCown*. Therefore, for at least this reason, claim 21 is patentable over *Marathe* in view of *Farrar* and *McCown*.

Amended claims 22-24 depend from and add additional features to independent claim 21. Therefore, by virtue of their dependency, these claims are also patentable over *Marathe* in view of *Farrar* and *McCown*.

The Examiner further rejected claims 22-24 since they recited product by process features. However, claims 22-24 has been amended to exclude such features. Therefore, for at least this reason and for the reason provided above, claims 22-24 are patentable.

Conclusion

In view of the foregoing, the Applicants respectfully submit that claims 1-8 and 21-24 are in a condition for allowance. Early issuance of Notice of Allowance is respectfully requested.

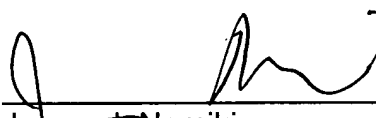
If the Examiner has any questions, he is invited to contact the undersigned at (503) 796-2099.

The Commissioner is hereby authorized to charge shortages or credit overpayments to Deposit Account No. 500393.

Respectfully submitted,
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